Volatility as a risk measure

AAA, a specialist in dynamic asset allocation based on risk management, is pleased to present its first "Risk Letter". In this edition, we examine volatility, one of the most popular risk measures, because it is both easy to understand and easy to calculate. But is it a good tool for investors who want to measure risk and why not, calculate risk-adjusted returns?

Volatility is the most widespread measure of risk. The reason of its success comes from the fact that it is easy to understand (volatility, as anyone knows, represents the deviation of an asset return from its historical mean) and also easy to compute (one can calculate volatility with a built-- in formula in a spread sheet). Common belief is that the higher the volatility, the higher the risk and, over the long term, the higher the return. And this is pretty much the basis for Modern Portfolio Theory, where portfolios are optimized in a mean-- variance (volatility) framework, meaning that they are constructed taking into account the risk (viewed as volatility) and the expected return.

But how good is volatility in measuring the risk of an asset class? Actually, a pretty good one when the underlying data is normally distributed. The problem arises from the fact that it is not. Stocks, bonds, hedge funds, commodities, asset classes in general are not normally distributed. Thus, looking at the volatility of such investments or any combination of them as the sole risk measure usually leads to disappointment.

- Let's look at a very simple example to illustrate the purpose: imagine you are looking to invest and that for some reason your choice is down to fund A versus fund B. Let's now imagine that fund A and fund B had the following returns over the past year:

	Monthly returns												Volatility
Fond A	1,0%	2,0%	0,2%	6,0%	0,4%	2,0%	0,5%	2,0%	3,0%	0,6%	0,8%	1,9%	5,6%
Fond B	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	0,0%

  If you look at volatility only, fund B seems less risky than fund A. But would you choose it?

- The other problem with volatility comes from the fact that it gives the same weight to positive and negative outcomes. This can be illustrated by another simple (but not very realistic) example, that of fund B and fund C, that have the following returns and volatilities:

	Monthly returns												Volatility
Fond B	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	-0,5%	0,0%
Fond C	0,5%	0,5%	0,5%	0,5%	0,5%	0,5%	0,5%	0,5%	0,5%	0,5%	0,5%	0,5%	0,0%

Both funds B and C have a volatility of 0% over the period. But fund C is definitely the one that you would prefer.

- Finally, volatility gives no information about the probability and the size of a possible future negative outcome. If fund A consisted in an option selling strategy, it could very well have returns like the one exhibited for some time… followed, at some point by a very extreme result such as, for example-- 15%. If you knew nothing about the strategy, this event would be very unexpected for you. Volatility of that fund would only rise … after the event.

Volatility gives certain information about the dispersion of returns around the mean, but gives equal weight to positive and negative deviations. Moreover, it completely leaves out extreme risk probabilities. Volatility is thus a very incomplete measure of risk. To be used wisely, especially in the context of portfolio construction!

Adina Grigoriu, CEO
Member of the French Institute of Actuaries